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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,731	03/09/2004	Aritaka Ohno	KPO195	3404

25271 7590 03/10/2006

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EXAMINER	
TURNER, SAMUEL A	
ART UNIT	**PAPER NUMBER**
2877	

DATE MAILED: 03/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/797,731	OHNO ET AL.	
	Examiner	Art Unit	
	Samuel A. Turner	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 February 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/9/04,9/22/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Title

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 5 are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.

In claim 4 if $L4 \geq 8L$ it is certainly $\geq 4L$.

In claim 5 there is no antecedent basis for "the optical reintegrated circuit". Further, $|L3\text{-}L5 \geq L$ is missing an absolute value sign.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Szafraniec et al(6,801,319).

FIG. 2
(PRIOR ART)

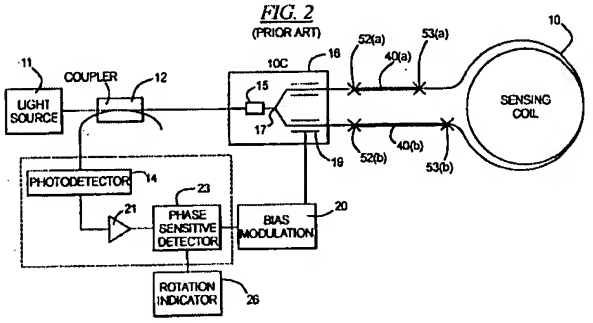
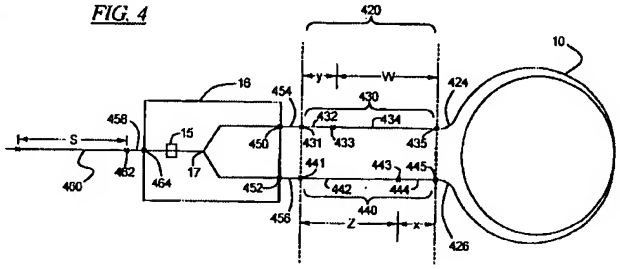


FIG. 4



With regard to claim 1, Szafraniec et al teach a fiber optic gyroscope in which a light beam from a light source(11) is sequentially passed through an optical fiber and an optical fiber coupler(12) to be incident on a substrate-based optical integrated circuit(16) having the function to serve as a polarizer(15) and having a branching optical waveguide(17);

light beams which are branched by the optical integrated circuit are made to be incident on the opposite ends of a single mode fiber optic coil(10) as a clockwise rotating beam and a counter-clockwise rotating beam;

the clockwise rotating beam and the counter-clockwise rotating beam which have propagated through the fiber optic coil(10) are coupled together in the optical integrated circuit to produce an interference therebetween;

the interference beam is introduced from the optical fiber coupler(12) to a light receiver(14) in order to convert the light intensity into an electrical signal; and

the electrical signal is used to detect an angular rate(26) applied to the fiber optic coil about the axis thereof further comprising;

a first polarization maintaining optical fiber connected between the optical fiber coupler and the optical waveguide of the optical integrated circuit and having an polarization axis coincident with the direction of the TE mode in the optical waveguide, the first optical fiber having a length L1(460; column 8, lines 20-26);

a second and a third polarization maintaining optical fiber connected to remaining two end faces of the optical waveguide of the optical integrated circuit at respective one end, respectively, where the polarization axis is coincident with the direction of the TE mode in the optical waveguide, the second and the third optical fiber having a length of 12 and L4, respectively(432,442; column 7, lines 33-44); and

a fourth and a fifth polarization maintaining optical fiber connected to the other end of the second and the third polarization maintaining optical fiber, respectively, at respective one end where the polarization axis of the connected fibers are displaced by an angle of 45^0 the other ends of the fourth and the fifth optical fiber being connected to the opposite ends of the fiber optic coil, the fourth

and the fifth optical fiber having a respective length of L3 and L5(434,444; column 7, lines 33-67);

the optical fibers disposed between the light source and the optical integrated circuit except for the first polarization maintaining optical fiber being all constructed with single mode optical fibers(12; column 1, line 21-column 2, line 42);

denoting the length which is required to produce a group delay time difference between orthogonal polarizations of each of the polarization maintaining optical fibers which is in excess of the coherence length of a light beam from the light source by L, the fiber lengths satisfying the following requirements:

(L>(Lc x B)/ λ, for Stafraniec $B=L_B$: L>(50μm x [1 to 3 mm])/(830nm) L>60mm to 180mm)

$L1 \geq L$ ($s = 4400L_B \geq$ 60mm to 180mm),

$L3 \geq L$ ($w = 2200L_B \geq$ 60mm to 180mm),

$L5 \geq L$ ($x = 1100L_B \geq$ 60mm to 180mm)

$|(L1+L2)-L3| > L$ ($|(s+y)-w| = 3000L_B >$ 60mm to 180mm),

$|(L1+L4)-L5| > L$ ($|(s+z)-x| = 5200L_B >$ 60mm to 180mm)

$||(L1+L2)-L3| \cdot |(L1+L4)-L5|| \geq L$ ($||(s+y)-w| \cdot |(s+z)-x|| = 2200L_B >$ 60mm to 180mm).

As to claim 2, further satisfying the following requirements:

$|L1-L3| \geq L$ ($|s-w| = 2200L_B >$ 60mm to 180mm),

$|L1-L5| \geq L$ ($|s-x| = 3300L_B >$ 60mm to 180mm)

$||L1-L3|-|L1-L5|| > L(||s-w|-|s-x||=1100L_B > 60mm$ to 180mm).

As to claim 3, , further satisfying the following requirements:

$L2 \geq L(y = 800L_B \geq 60mm$ to 180mm),

$L4 \geq L(z = 1900L_B \geq 60mm$ to 180mm),

$||L1-L2|-L3| \geq L(||s-y|-w|=1400L_B > 60mm$ to 180mm)

$||L1-L4|-L5| > L(||s-z|-x|=1200L_B > 60mm$ to 180mm)

$|||L1-L2|-L3|-||L1-L4|-L5|| \geq L(|||s-y|-w|-||s-z|-x||=200L_B >$ 60mm to 180mm).

As to claim 4, further satisfying the following requirements:

$L2 \geq L(y = 800L_B \geq 60mm$ to 180mm),

$L3 \geq 4L(w = 2200L_B \geq 240mm$ to 720mm),

$L4 \geq 4L(z = 1900L_B \geq 240mm$ to 720mm),

$L4 \geq 8L(z = 1900L_B \geq 480mm$ to 1440mm),

$L5 \geq 16L(x = 1100L_B \geq 960mm$ to 2880mm).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al(5,854,678) in view of Ohno et al(5,136,667).

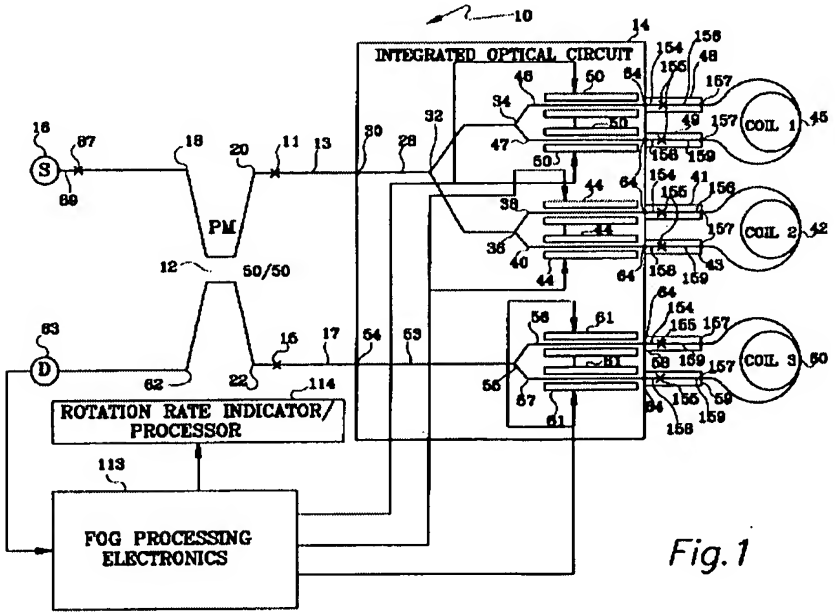
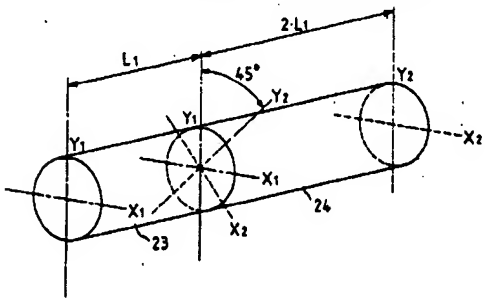


Fig. 1

FIG. 2 PRIOR ART



With regard to claim 5, Liu et al teach a fiber optic gyroscope(10) in which a light beam from a light source(16) is sequentially passed through a polarization maintaining optical fiber and a polarization maintaining optical fiber coupler(12) to be incident on a substrate-based optical integrated circuit(14) having the function to serve as a polarizer(column 2, lines 11-21) and having a branching optical waveguide(55);

light beams branched by the optical integrated circuit are made to be incident on the opposite ends of a single mode fiber optic coil(60) as a clockwise rotating beam and a counter-clockwise rotating beam;

the clockwise rotating beam and the counter-clockwise rotating beam which have propagated thorough the fiber optic coil(10) are coupled together in the optical reintegrated circuit to produce an interference therebetween;

the interference beam is introduced from the optical fiber coupler(12) into a light receiver(63) to convert the light intensity into an electrical signal; and

the electrical signal is used to detect an angular rate(114) applied to the fiber optic coil about the axis thereof further comprising;

a second and a third polarization maintaining optical fiber connected to remaining two end faces of the optical waveguide of the optical integrated circuit at respective one end where the polarization axis of the second and the third optical fiber is coincident with the direction of the TE mode of the optical waveguide, the

second and the third optical fiber having a respective length of L2 and L4(154,158; column 2, line 40-column 3, line 23); and

a fourth and a fifth polarization maintaining optical fiber which are connected to the other end of the second and the third polarization maintaining optical fiber, respectively, at their respective one end where the inherent axes are displaced by an angle of 45^0 from each other, the other ends of the fourth and the fifth optical fiber being connected to the opposite ends of the fiber optic coil, the fourth and the fifth optical fiber having a respective length of L3 and L5(154,158; column 2, line 40-column 3, line 23).

While Liu et al teach that the length of 158(L4) is slightly different then that of 154(L2), the length of 159(L5) is more than 4 times 158(L4), the length of 159(L5) is more than twice 156(L3), and the length of 156(L3) is more than twice 154(L2), Liu et al fail to teach the relationship between "a length required to produce a group delay time difference between orthogonal polarizations in each polarization maintaining optical fiber which is in excess of the coherence length of a light beam from the light source" and the lengths 154(L2), 156(L3), 158(L4), and 159(L5).

Ohno et al teach that in a fiber Lyot depolarizer, figure 2, the length $L1 \geq (2\pi \times lc)/(\Delta\beta \times \lambda)$.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the depolarizers of any length so long as they maintain the ratios taught in Liu and are long enough to provide the needed decorrelation,

(why the depolarizers are used). A change in size is generally recognized as being within the level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CCPA 1955). Further $L1 \geq (2\pi \times lc)/(\Delta\beta \times \lambda)$ from Ohno can be recognized as related to $L > (Lc \times B)/\lambda$, where L is "the length required to produce a group delay time difference between orthogonal polarizations in each polarization maintaining optical fiber which is in excess of the coherence length of a light beam from the light source". As this is the case then the first segment of the fiber Lyot depolarizer 154/156 would be $154(L2) \geq L$. This would satisfy:

$L3 \geq L$, (156(L3)>2 x 154(L2) thus is ≥L)

$L5 \geq L$, (159(L5)>4 x 158(L4) only slightly different from 4 x 154(L2) thus must be ≥ L)

$|L3\text{-}L5 \geq L\ (|156(L3)\text{-}159(L5)| > |(2 \times 154(L2))\text{-}(4 \times 154(L2))| = |\text{-}2 \times L2|$ and since $L2 \geq L$ then $2 \times L2 \geq L$ thus $|156(L3)\text{-}159(L5)|$ must be > than L.

As to claim 6, further satisfying the following requirements;

$|L2\text{-}L3| \geq L\ (|154(L2)\text{-}156(L3)| = |154(L2))\text{-}(2 \times 154(L2))| = |\text{-}L2|$ and since $L2 \geq L$ then $|154(L2)\text{-}156(L3)|$ must be ≥ than L,

$|L4\text{-}L5| > L\ (|158(L4)\text{-}159(L5)| = |154(L2))\text{-}(4 \times 154(L2))| = |\text{-}3 \times L2|$ and since $L2 \geq L$ then $|158(L4)\text{-}159(L5)|$ must be ≥ than L

$||L2\text{-}L3|\text{-}|L4\text{-}L5|| \geq L\ (||154(L2)\text{-}156(L3)|\text{-}|158(L4)\text{-}159(L5)||= ||154(L2))\text{-}(2 \times 154(L2))|\text{-}|154(L2))\text{-}(4 \times 154(L2))||= |2 \times L2|$ and since $L2 \geq L$ then $||154(L2)\text{-}156(L3)|\text{-}|158(L4)\text{-}159(L5)||$ must be ≥ than L.

Relevant Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nishiura et al(5,245,407) see figure 4, Szafraniec et al(6,175,410) see figure 12b, and Ohno et al(6,990,269) see claims 1-4.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A. Turner whose phone number is 571-272-2432.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached on 571-272-2800 ext. 77.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Samuel A. Turner
Primary Examiner
Art Unit 2877